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Does Algorithmic Awareness Inculcate Mindful News Consumption in Social Media?

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Short Paper

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Abstract

Social media curation algorithms can raise problems in terms of distortion of reality and mindless news consumption behaviors. This paper proposes algorithmic awareness as a plausible tool towards instilling mindful news consumption on social media platforms. Specifically, the paper investigates the effects of an Algorithmic Awareness (AA) intervention on 1) users perceived awareness about algorithmic curation and filter bubble effect and 2) news consumption behaviors in social media platforms. Based on concepts from information processing and mindfulness, we propose that imparting algorithmic awareness can coerce social media users to make more mindful decisions about whether to believe news posts and perform activities that contribute to their spread (e.g., read, share, fact check, customizing feed). To this end, we design an explanation-based intervention and propose to conduct a between subject's online experiment.

Keywords: algorithmic awareness, social media, news consumption, filter bubble

Introduction

With the increasing power of artificial intelligence, algorithms have become a persuasive part of our daily lives helping us in decision making, information consumption and problem solving (Dwivedi et al., 2021). One such popular algorithm is the social media curation algorithms that curate personalized content by prioritizing, classifying and filtering information based on parameters such as user's past behavior and popularity. While the primary motive in employing such algorithms is to reduce information overload and increase user engagement, curation algorithms can raise problems in terms of distortion of reality, for example through inducing a filter bubble effect.

In a filter bubble, social media users are presented content that interests them and that fits their opinions or ways of thinking, establishing aversion towards unfamiliar and opposing opinions. Eli Pariser puts forth the term 'filter bubble' to illustrate the potential for algorithmic personalization to effectively distance users from a diversity of viewpoints or content (Pariser, 2011). With more than a third of US adults regularly consuming news through platforms like Facebook (Pew research center, 2022), a filter bubble may lead to flawed information consumption and dissemination and subsequently, induce societal polarization. For instance, a left aligned Facebook user would start seeing more of liberal news content and stop receiving recommendation from their conservative friends' overtime, based on their past engagement. While a number of empirical studies find support for the filter bubble hypothesis (Brown et al., 2022; Kitchens et al., 2020), some studies have also challenged it (Arceneaux et al., 2013; Fletcher & Nielsen, 2019). Nevertheless, whether a filter bubble effect exists or not, there is sufficient evidence to the claims that without adequate awareness, social media curation algorithms may ease fake news dissemination and increase susceptibility to affective polarization (Arora et al., 2022; Iandoli et al., 2021; C. Lee et al., 2018; J. K. Lee et al., 2014). Compounding this effect, more than half of social media users were found to be

unaware or holding incorrect perceptions about algorithmic curation (Eslami et al., 2015). Parallelly, platform owners are not sufficiently proactive on being transparent about their algorithms, its fairness and accountability and the probable detrimental effects. To this end, we propose that an accurate awareness of curation algorithms may be a plausible tool towards mitigating the unintended consequences of social media algorithmic curation.

Extant research in IS (Information Systems) and HCI (Human Computer Interaction) domains have pointed out the significant role of algorithmic perceptions in forming attitudes towards social media platforms, user acceptance of platforms and platform behaviors. Nevertheless, the literature has 2 prominent gaps. 1) Although social media research calls for immediate attention towards research mitigating the flawed consumption patterns and instilling mindful consumption behaviors (Arora et al., 2022; Moravec et al., 2022), few have theorized and tested the role of algorithmic awareness as a tool (Fouquaert & Mechant, 2022). Filling this gap has major implications for algorithmic literacy interventions and platform transparency for a healthier social media ecosystem 2) Within extant research on algorithmic awareness and perceptions, there are few studies that examine the role of algorithmic awareness intervention for societal benefit. Most studies are motivated to examine how algorithmic awareness and transparency interventions can be designed to increase trust in social media platforms, thus increasing acceptance and satisfaction on using them (Shin, 2020; Shin, 2021). While this point of view is valuable, there is a need for an alternate research direction that investigates how algorithmic awareness can be used for societal benefit, motivated towards healthier social media ecosystem over business performance.

On similar lines, Fouquaert and Mechant, in their recent paper, hints at the plausible role of algorithmic awareness interventions in instilling cognitive literacy and thus, critical concerns towards curation algorithms (Fouquaert & Mechant, 2022). Literature reviews in IS domain also calls for mitigation strategies that bring awareness of filter bubble effect (Arora et al., 2022) and ways to trigger mindful consumption behaviors (Moravec et al., 2022). Against this backdrop, the paper examines whether imparting an AA (Algorithmic Awareness) intervention, can make social media users more aware and coerce them to make mindful decisions about whether to believe news posts and perform activities that contribute to their spread (e.g., read, share, fact check). Hence, we examine the following questions.

RQ1: Does imparting algorithmic awareness increase users perceived awareness about social media algorithms?

RQ2: What is the effect of an AA intervention on believability and news consumption behaviors in social media platforms?

Theoretical development

Information Processing in Social Media Platforms

Compared to others like ecommerce platforms, social media platforms are mostly used with a hedonic mindset and in such a context, users are less likely to critically analyze information compared to utilitarian contexts. Basically, people tend to be less mindful while browsing on social networking sites. This results in users retorting to heuristic information processing (using mental shortcuts to reduce cognitive effort) over systematic processing (exerting cognitive effort in decision making). Studies have shown that this way of information processing and consumption may lead to flawed information consumption, particularly in the context of news consumption (Kim & Dennis, 2019).

Confirmation bias and herding are two heuristic processes that predict news consumption through social media platforms. Social media users are more likely to believe and engage with news posts and opinions that align with their existing beliefs on the topic (confirmation bias) (Kim & Dennis, 2019). For instance, during elections, users tend to consume, engage, and share online posts that puts their candidate in the positive light, while ignoring any negative posts against them. As per the herding process, users have a tendency to imitate the behavior of their herd, particularly strong ties, while sharing content (Mattke et al., 2020). Both these processes lead to users consuming and engaging with more of news items supporting their own political view points and less of opposing viewpoints. Parallelly, personalization algorithms in platforms like Facebook exaggerates these effects as they push content based on user's preferences and past Behavior. Altogether, social media algorithms tend to drive problematic and mindless news consumption

due to first, the hedonic mindset of users leading to second, a tendency towards heuristic processing based on confirmation bias and herding and finally, algorithmic filtering exaggerating the heuristic processing.

Nevertheless, we propose that these issues persist and exaggerate due to lack of awareness about personalization algorithms. And imparting appropriate algorithmic awareness may lead to mindful news consumption Behaviors. For instance, during the presidential elections, a weakly right aligned Facebook user would be slowly falling into a filter bubble, with his/ her newsfeed being flooded with conservative news posts and ties. S/he is unaware of the role played by curation algorithms in pushing congenial content to him/her, and perceives the news feed as the reality. If such a user is made aware of the presence of personalization algorithms, how it curates their feed and what are the ethical implication of this curation, then, there are chances that he/she will critically evaluate the feed and the credibility of the news posts recommended. S/he may at least make an effort to understand how the feed functions, proactively curate their feed and seek more diverse viewpoints. Further, an algorithmically aware Facebook user may be able to detect malignant political advertising much faster than someone who is unaware. To this end, we investigate the role of imparting algorithmic awareness on information processing in social media.

Algorithmic Awareness in Social Media Platforms

Research on algorithmic awareness and its importance emerged in HCI domain and spread to IS domain within a span of few years. Algorithmic awareness has been conceptualized in different levels based on the extent of understanding about algorithms and the context. Researchers are in consensus that algorithmic awareness refers to a cognitive understanding over technical understanding about algorithms. Rader et al. (2020) define algorithmic awareness as "participants' basic awareness of the News Feed algorithm, and their understanding of where the agency (human vs system) lies behind what they see when they visit their News Feeds" (p.5). In the context of social media, design researchers, Eslami and colleagues have loosely defined algorithmic awareness as how knowledgeable the users are about the existence and working of social media algorithms (Eslami et al., 2015). As our context demands awareness about algorithmic media content curation in social media settings, we adopt the definition by Zarouali et al. (2021), as "the extent to which people hold accurate perceptions of what algorithms do in a particular media environment, as well as their impact on how users consume and experience media content" (p.2). Algorithmic awareness can develop in an individual in multiple ways. Organically, it develops through their own experience using algorithmic systems, experiences of others and folk theories (Rader et al., 2018). Qualitative studies on algorithmic perceptions find that such an understanding based on folk theories are inaccurate and may lead to formation of inappropriate attitude towards algorithmic platforms (Bucher, 2017; Ngo & Krämer, 2021).

Accurate algorithmic awareness can also be developed in users through interventions explaining the workings of algorithms using applications, texts, warnings, or videos. This is the most pragmatic and valuable approach in developing and understanding the effects of algorithmic awareness. While a few studies develop visualization applications to expose the black box of algorithms, others use textual explanations and scenarios. The seminal project by Eslami and colleagues developed *FeedVis*, an application that revealed the difference between their algorithmically curated and unadulterated Facebook news feed to users, triggering algorithmic awareness and setting the base for research on the positive impacts of algorithmic awareness (Eslami et al., 2015). Building on this, Fouquaert & Mechant in 2022, showed that an AA intervention for Instagram could increase the cognitive media literacy of the users and may raise critical concerns about the platform. Whereas, Rader and colleagues explain how textual explanations can act as interventions to raise awareness and can have an impact on attitudes towards social media platforms (Rader et al., 2018). None has tested the role of AA intervention specifically on news consumption context. To this end, we propose a conceptual model, that examines the role of an AA intervention on users perceived awareness about social media algorithms and news consumption patterns (Figure 1).

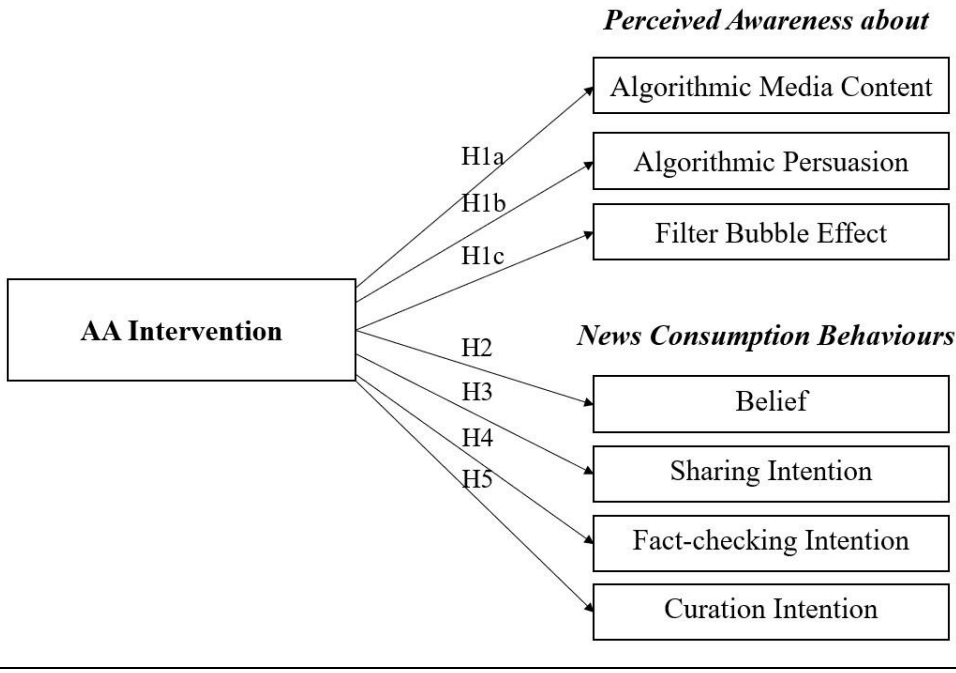

Figure 1. Conceptual Model

Impact of AA Intervention on Perceived Awareness

The first step towards analyzing the effectiveness of our AA intervention towards mindful consumption is to investigate whether the intervention raised users perceived awareness about algorithms. Extant research has examined perceived awareness about algorithms in different ways. While qualitative studies elaborately explicate users' awareness about algorithms through interviews and social media walkthroughs (Dogruel, Facciorusso, et al., 2022; Hargittai et al., 2020), quantitative studies have only explored at a basic level. While some of them measure awareness by simply asking users how aware they are about algorithms, assuming that users are familiar with the terminology (Gran et al., 2021), others deduce users understanding through indirect questions regarding algorithms (Dogruel, Masur, et al., 2022). Parallelly, systematic literature reviews in social media polarization area calls for investigating awareness at a higher level, specifically, whether social media users are aware of the filter bubble effect and algorithmic persuasion (Arora et al., 2022). To this end, we aim to measure perceived awareness on an advanced level, specifically, measuring user's awareness about algorithmic media content, algorithmic persuasion, and the filter bubble effect.

We propose that our AA intervention would increase users perceived awareness about algorithmic media content, persuasion, and filter bubble effect. Prior studies offer preliminary support in this direction, specifically, explanations regarding how and why Facebook algorithms curate content, triggers awareness about algorithmic curation and platforms agency in curation process (Eslami et al., 2015; Rader et al., 2018). Fouquaert & Mechant (2022) finds that being exposed to awareness questionnaire alone significantly raised users' awareness related to ethical concerns on Instagrams algorithms. On similar lines, we argue that our explanations on Facebook algorithms would trigger thinking about ethical issues such as filter bubble effect and persuasion. To this end, we posit,

H1a: Users who are given AA intervention would show higher algorithmic media content awareness compared to the users in control group.

H1b: Users who are given AA intervention would show higher algorithmic persuasion awareness compared to the users in control group.

H1c: Users who are given AA intervention would show higher awareness of filter bubble effect compared to the users in the control group

Impact of AA intervention on News Consumption Behaviors

We propose that instilling algorithmic media content awareness in users through an AA intervention will lead to mindful news consumption behaviors. We explain the theoretical reasons behind this relationship based on the perspectives of information processing and mindfulness.

Based on information processing theory, individuals process information and decide how to engage with it in on two ways – heuristically and/or systematically (Chen & Chaiken, 1999). As mentioned earlier, social media platforms aid heuristic processing of information. Heuristic processing involves evaluating the veracity of messages by placing a greater emphasis on readily available context information, such as the source's identity or other non-content cues. By using mental shortcuts based on their pre-existing knowledge structures, such as confirmation bias and the herd heuristic, people tend to reduce their cognitive effort. In contrast, if systematic processing is used in a social media environment, users will exert greater cognitive effort to evaluate a news post by assessing the veracity of the source, the message, and other aspects before deciding whether to believe or share the content. Users are motivated to engage in systematic processing when they are deeply invested in the issue (issue involvement) or when responding to the post would have certain negative effects on them personally (response involvement). (Chen & Chaiken, 1999). We posit that our AA intervention will increase the perceived awareness about news filtering, automated decision making, human and algorithm interplay and the ethical issues related to automated content curation (Zarouali et al., 2021). Such an awareness will increase the response involvement or sense of personal and societal consequences for the user regarding their decisions. This will motivate the algorithmically aware users to pursue systematic processing of the news posts over the heuristic processes they usually employ.

Based on mindfulness perspective, we posit that those users given AA intervention would be more mindful compared to the control group, while consuming social media news information, thus employing systematic processing. Mindfulness in IT (Information Technology) use have received significant scholarly attention as it is linked to healthy online behavior and helps in designing healthier ecosystems (Thatcher et al., 2018). Mindfulness can help users overcome inappropriate or addictive IT use. IT mindfulness is defined as "a dynamic IT-specific trait, evident when working with IT, whereby the user focuses on the present, pays attention to detail, exhibits a willingness to consider other uses, and expresses genuine interest in investigating IT features and failures" (Thatcher et al., 2018, p.832). Both general mindfulness and IT mindfulness studies find that mindfulness is a personality state that is malleable and it can be cultivated through training, role modelling and awareness building activities. For instance, Jensen et al. (2013) found that IT security training elevates users' mindfulness about phishing to higher levels. On similar lines, we argue that the AA intervention would elevate users' mindfulness about algorithmic curation while consuming information in social media platforms. More mindful user would employ systematic processing of information over heuristic cues, for instance, pay attention to details such as congruency and credibility of information, why the particular post is being shown, recognition of any persuasive intent etc. Thus, more mindful users are less likely to blindly believe and share news posts and more likely to factcheck and engage in curating their feed.

Findings from extant literature offers support to our argument. Fouquaert & Mechant (2022), finds that creating awareness about Instagram algorithms using an awareness application, generated critical concerns about the content generated by Instagram algorithm. Eslami and colleagues finds that an AA intervention to Facebook users, while increasing their long-term satisfaction in using the platform, also made them more mindful of the content they browsed and motivated them to perform behaviors directed at exerting control over their feed (Eslami et al., 2015).

When additional awareness is given about the algorithmic artefact or the process the user is interacting with, we argue that it influences 2 aspects; user's cognitive processing of information presented and user's decision making based on the information. In Facebook news consumption context, user processes the news post in regards to credibility and truthfulness of the content, source and platform. And user makes decisions based on this processing, on whether to believe, share, fact check, hide or unfollow the post. A user who has just gotten aware of the fact that Facebook filters their news feed based on stored personal data, may use more critical processing skills than a user who is unaware of the Facebook algorithms. Thus, s/he maybe a

little more sceptical than unaware users to believe the news posts. Further, this influences his/her decision-making process as well. An unaware user might have shared the post based on the likes or their congenial views, an algorithmically aware user may contemplate what effect the action would have on their algorithmic persona. Higher awareness about algorithms' role in curating news feed, will also trigger decisions to perform curative actions that help user to exert control over their feed, such as hiding certain posts, following and unfollowing certain people and groups etc. Based on these arguments, we posit,

H2: Users who are given AA intervention are less likely to blindly believe a Facebook news post compared to the control group

H3: Users who are given AA intervention are less likely to share a Facebook news post compared to the control group

H4: Users who are given AA intervention are more likely to fact check a Facebook news post compared to the control group.

H5: Users who are given AA intervention are more likely to engage in activities to curate their news feed compared to the control group

Effect of AA Intervention on Confirmation Bias

Humans tend to favor information that confirms their pre-existing beliefs and ignore information that challenges them. This is called confirmation bias (Festinger, 1957). Due to the reluctance to exert cognitive effort and to avoid cognitive dissonance, social media users also fall in the trap of confirmation bias. Kim and Dennis (2019) find that this is true with news consumption behaviors on Facebook, that users are more likely to believe, like and share those news posts that align with their pre-existing beliefs. We believe that algorithmic awareness would induce mindful behavior's even with posts confirming their beliefs as the effect of algorithmic awareness is over the credibility of the platform as a whole.

H6: The effect of AA intervention prevails even if the news posts align with users pre-existing beliefs on the topic (confirmation bias).

Methodology

In order to test the hypotheses, we plan to conduct a between effects online experiment.

Manipulation Treatment

We adopt the method followed by (Rader et al. 2018) and design an explanation-based AA intervention using content from Facebook official blog and the dimensions of AA scale (Zarouali et al. 2021). This ensures external validity and replicability for the intervention. Thus, the AA intervention would comprise of a text explaining 'what, why and how' of algorithmic content curation in Facebook news feed and the ethical issues surrounding it. For control group, we use a placebo text comprising of commonly known facts about Facebook business, to reduce confounding effect.

Dependent Variables

We adapt measures from previous studies, wherever possible, to ensure construct validity. To this end, awareness about algorithmic media content and algorithmic persuasion on Facebook, would be measured by adapting the scales developed by Zarouali et. al (2021). Whereas, due to the lack of existing scale, we develop new items to measure awareness of filter bubble effect based on past literature (Kitchens et al., 2020; Pariser, 2011).

We adopt the method followed by previous studies in social media and news consumption, to measure the belief and consumption behaviors on news posts (Kim and Dennis 2019; Moravec et al. 2020). First, a set of fake news posts about 2 popular sociopolitical issues (Covid/CAA/abortion) would be compiled to be presented for the study. 10 news articles are selected to be presented as posts closely resembling the Facebook page. The source would be kept blank or neutral, in order to avoid any effect. The headlines would be designed to avoid major differences in the type and magnitude of feelings they would generate. The posts would be designed to be similar in nature except for the image and the headline to remove any confounding

platform level factors that might influence believability and consumption. This set will contain posts that support and oppose the issues. The post believability would be measured by asking how believable/truthful/ credible the news post is for the respondent. Behavioral intentions of the users would be measured by asking how likely the participant would be to share and fact check the specific post, if it comes on his Facebook newsfeed. The strength of confirmation bias would be measured by multiplying the news post's importance to the participant by the participant's position on the article. We measure the tendency to engage in news feed curation activities (such as hide posts, change privacy settings, and follow specific pages in an attempt to alter the feed) drawing from prior studies on consumptive news feed curation practices (F. L. F. Lee et al., 2019; Lu, 2020).

Experimental Design

In step 1, all participants are given a pre-test survey to assess their values on some of the dependent variables (not including perceived awareness variables in the pretest in order to avoid confounding effect on manipulation). They are asked to imagine a scenario where they are going through their own Facebook news feed and 5 news articles would be presented to them as posts closely resembling the Facebook page. After each post, questions would be asked to measure the believability, tendency to share and fact check and their curation activity patterns. In step 2, the manipulation treatment is administered. Specifically, half of the respondents are randomly assigned for algorithmic awareness treatment, and rest to the control group. In step 3, a post test survey similar to the pretest survey is floated to measure the dependent variables, specifically, perceived awareness, belief, news consumption behaviors and curation behaviors, after the manipulation treatment. Post test survey also includes the manipulation check and other demographic questions.

Discussion

We propose to investigate the effects of Algorithmic Awareness (AA) interventions on 1) users perceived awareness and 2) news consumption behaviors in social media platforms. And thus, we propose Algorithmic Awareness as a significant tool in instilling mindful social media use. Our study is an answer to calls in IS community towards healthier social media ecosystems and mitigation or educational strategies focused on mindful social media use (Arora et al., 2022; Kim & Dennis, 2019; Moravec et al., 2022). Our study holds significant contributions to extant literature. First, it proposes to fill a significant gap in literature by theorizing the role of algorithmic awareness in information processing and information consumption behaviors. Second, it advocates for algorithmic literacy from educators as well as the government and transparency interventions by the platform, for building a healthy social media ecosystem. Third, we take an alternate point of view by using algorithmic awareness as a tool towards societal benefit over platform benefit. Finally, we expand the literature on algorithmic perceptions and social media news consumption behaviors.

Citizen's algorithmic awareness is particularly relevant for the recent discussions around datafication and data injustice. Algorithms are the core processes enabling datafication. Social media platforms employ datafication such that daily interactions of users with the platform can be extracted into a data format, studied, and put to social use. But, unregulated datafication is found to lead to exploitation, discrimination, loss of privacy, surveillance, manipulation, exclusion of necessities and injustices (Dencik et al., 2022). While data driven discrimination and manipulation is progressing at a similar pace to datafication systems, awareness and mechanisms to mitigate it, are not. There is ongoing debate on what exactly are the tenets of data justice and how these can be effectively implemented through regulations and platform design (Taylor, 2017). Taylor (2017) proposes that autonomy in visibility, disengagement and right against discrimination should be the pillars of data justice. Others point at the issues of fairness, accountability, control and transparency as the pillars of just algorithms (Shin, 2020). Whatever may be the guidelines for data justice, citizens algorithmic awareness is a foundational element for effective implementation of these guidelines. To this end, studying and proposing mechanisms that instill awareness about algorithms is a significant contribution towards information systems research.

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